

MAY 18 2007

AMENDMENTS TO THE CLAIMS

1. (Currently amended): A method of managing ~~critical~~ resource usage comprising:
queuing accesses of at least one associated resource in at least one respective resource queue;
monitoring queue depth in the at least one ~~critical~~ resource queue for a predetermined high level of resource consumption;
preventing issue of subsequent commands ~~of~~ from a client to a server in a client/server combination in response to a command of the client/server combination that increases resource consumption to the predetermined high level;
queuing an identifier of the client/server combination on a waiting queue;
removing the client/server combination identifier from the waiting queue in a queuing order as resource consumption declines; and
re-enabling issue of commands ~~of~~ from the client to the server in the client/server combination.
2. (Currently amended): The method according to Claim 1 further comprising:
managing ~~critical~~ resource usage for clients that require a specific resource.
3. (Currently amended): The method according to Claim 1 further comprising:
enabling issue of commands of a client/server combination in order of queuing as resource availability is restored.
4. (Currently amended): The method according to Claim 1 further comprising:
receiving a command from a client to a server that increases consumption of a resource to a high predetermined resource consumption condition;
setting a flag indicative of ~~a critical~~ the predetermined resource condition ~~of the~~ resource;

KDESTNER BERTANI LLP
18662 MACARTHUR BLVD
SUITE 400
IRVINE, CA 92612
TEL (949) 251-0260
FAX (949) 251-0260

allowing the command to complete; and
rejecting subsequent commands issued by the client to the server.

5. (Original): The method according to Claim 1 further comprising:
detecting an increase in consumption of a resource to a level above a preselected
limit; and
queuing an identifier of the client/server combination on a waiting queue
associated with the resource.

6. (Currently amended): The method according to Claim 5 further
comprising:
detecting a decline in consumption of the resource;
removing a client/server combination identifier from the waiting queue in the
queue order; and
enabling subsequent commands of the client/server combination removed from the
waiting queue for operation.

7. (Original): The method according to Claim 1 implemented in a storage system
further comprising:
at least one storage controller;
at least one host adapter operational as a client;
at least one storage array configured as physical storage and logical storage, the
logical storage being arranged in logical units (LUNs) operational as
servers;
at least one adapter/LUN combination operational as a client/server combination;
and
at least one resource selected from a group consisting of dynamic caching
structures, queues, buffers, and remote copy resources.

8. (Currently amended): A storage system comprising:
at least one storage controller ~~capable of~~ controlling data transfers between at least
one host adapter and at least one storage array configured as physical
storage and logical storage, the logical storage being arranged in logical
units (LUNs);

KORSTNER BERTANI LLP
18661 MACARTHUR BLVD.
SUITE 400
IRVINE, CA 92612
TEL (949) 211-0210
FAX (949) 251-0260

at least one resource utilized in the data transfers;
at least one ~~critical~~ resource queue respectively associated with the at least one resource and ~~capable of queuing that queues~~ accesses to the associated resource; and
a logic that monitors the at least one ~~critical~~ resource queue for a predetermined ~~high resource~~ consumption condition, identifies an adapter that issues commands to a LUN in an adapter/LUN combination associated with a command that contributes to the ~~high predetermined resource~~ consumption condition, queues the identified adapter/LUN combination on a waiting queue, and prevents issue of subsequent commands of the identified adapter/LUN combination.

9. (Currently amended): The storage system according to Claim 8 further comprising:

a logic that detects a decline in resource consumption, dequeues the adapter/LUN combination identifier from the waiting queue, and re-enables commands of the dequeued adapter/LUN combination for operation.

10. (Original): The storage system according to Claim 8 further comprising:
at least one resource selected from a group consisting of dynamic caching structures, queues, buffers, and remote copy resources.

11. (Currently amended): The storage system according to Claim 8 further comprising:
a logic that manages ~~critical~~ resource usage for host adapters that require a specific resource.

12. (Currently amended): The storage system according to Claim 8 further comprising:
a logic that detects receipt of a command from an adapter to a LUN that increases consumption of a resource above a preselected limit, sets a flag indicative of a ~~critical~~ predefined condition of the resource, allows the received command to complete, and rejects subsequent commands issued by the adapter to the LUN.

KOESTNER BERTANI LLP
11662 MACARTHUR BLVD.
SUITE 400
IRVINE, CA 92612
TEL (949) 251-0350
FAX (949) 251-0260

13. (Original): The storage system according to Claim 8 further comprising:
a logic that detects an increase consumption of a resource above the preselected limit, and queues an identifier of the adapter/LUN combination on a waiting queue associated with the resource.

14. (Currently amended): The storage system according to Claim 13 further comprising:
a logic that detects a decline in consumption of the resource, removes an adapter/LUN combination identifier from the waiting queue in the queue order, and enables subsequent commands of the adapter/LUN combination removed from the waiting queue for operation.

15. (Currently amended): A data handling system comprising:
at least one controller ~~capable of~~ controlling data transfers between at least one client and at least one server;
at least one resource utilized in the data transfers;
at least one ~~critical~~ resource queue respectively associated with the at least one resource and ~~capable of queuing~~ that queues accesses to the associated resource; and
a logic that monitors the at least one ~~critical~~ resource queue for a predetermined high resource consumption condition, identifies a source that issues commands to a client in a source/client combination associated with a command that contributes to the high predetermined resource consumption condition, queues the identified source/client combination on a waiting queue, and prevents issue of subsequent commands of the identified source/client combination.

16. (Currently amended): The system according to Claim 15 further comprising:
a logic that detects receipt of a command from a client to a server that increases consumption of a resource above a preselected limit, sets a flag indicative of a ~~critical~~ predefined condition of the resource, allows the received command to complete, and rejects subsequent commands issued by the client to the server.

KOESTNER BERTANI LLP
16662 MACARTHUR BLVD.
SUITE 400
IRVINE, CA 92612
TEL (949) 231-0250
FAX (949) 231-0250

17. (Original): The system according to Claim 15 further comprising:
a logic that detects an increase in consumption of a resource above the preselected limit, queues an identifier of the client/server combination on a waiting queue associated with the resource.

18. (Currently amended): The system according to Claim 17 further comprising:

a logic that detects a decline in consumption of the resource, removes a client/server combination identifier from the waiting queue in the queue order, and enables subsequent commands of the client/server combination removed from the waiting queue for operation.

19. (Currently amended): An article of manufacture comprising:

a ~~controller~~ tangible processor usable medium having a ~~computable~~ readable program code embodied therein for managing ~~critical~~ resource usage, the ~~computable~~ readable program code further comprising:
a code causing the controller to queue accesses of at least one associated resource in at least one respective resource queue;
a code ~~capable of~~ causing the controller to monitor for a predefined high level of resource consumption;
a code ~~capable of~~ causing the controller to prevent issue of subsequent commands ~~of~~ from a client to a server in a client/server combination in response to a command of the client/server combination that increases resource consumption to the predefined high level;
a code ~~capable of~~ causing the controller to queue an identifier of the client/server combination on a waiting queue;
a code ~~capable of~~ causing the controller to remove the client/server combination identifier from the waiting queue in a queuing order as resource consumption declines; and
a code ~~capable of~~ causing the controller to enable issue of commands ~~of~~ from the client to the server in the client/server combination.

KOESTNER BERTANI LLP
18662 MACARTHUR BLVD.
SUITE 400
IRVINE, CA 92612
TEL (949) 251-0250
FAX (949) 251-0260

20. (Currently amended): The article of manufacture according to Claim 19 further comprising:

- a code ~~capable of~~ causing the controller to manage ~~critical~~ resource usage for clients that require a specific resource;
- a code ~~capable of~~ causing the controller to receive a command from a client to a server that increases consumption of a resource above a preselected limit;
- a code ~~capable of~~ causing the controller to set a flag indicative of a ~~critical~~ condition of the resource;
- a code ~~capable of~~ causing the controller to allow the command to complete; and
- a code ~~capable of~~ causing the controller to reject subsequent commands issued by the client to the server.

21. (Currently amended): The article of manufacture according to Claim 19 further comprising:

- a code ~~capable of~~ causing the controller to detect an increase in consumption of a resource above a preselected limit;
- a code ~~capable of~~ causing the controller to queue an identifier of the client/server combination on a waiting queue associated with the resource;
- a code ~~capable of~~ causing the controller to detect a decline in consumption of the resource;
- a code ~~capable of~~ causing the controller to remove a client/server combination identifier from the waiting queue in the queue order; and
- a code ~~capable of~~ causing the controller to enable subsequent commands of the client/server combination removed from the waiting queue for operation.

KOSTNER BERTANI LLP
18662 MACARTHUR BLVD.
SUITE 400
IRVINE, CA 92612
TEL (949) 251-0260
FAX (949) 251-0260